

THE RELATIONSHIP BETWEEN PROJECT PLANNING, RISK MANAGEMENT AND KNOWLEDGE INTEGRATION ON PROJECT SUCCESS

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ABSTRACT

The research aims to study different elements that can contribute to the success of some project in construction industry specifically large scale construction projects. The objective is to evaluate the impact of project planning, project risk management, knowledge integration on project success. It is a quantitative study in which responses from n=175 respondents were collected using random sampling method. It is hypothesized that the project planning, knowledge integration and risk management, all contributes to the performance of the project in an efficient way. The findings are somehow in accordance with our hypothesis. Project planning and risk management are positively influencing the project success, but knowledge management has not shown significant influence on the success of the project. It is depicted that proper and in time planning and management of risk are the two factors contributing to the success of large-scale construction projects, so these factors need to be managed appropriately.

Keywords: Project Planning, Risk Management, Knowledge Integration, Project Success.

INTRODUCTION

There is a strong relationship between project management and project performance. Project management in the construction industry is one of the most important factors affecting project performance. The delays in the delivery of construction projects are seen as one of the most frequent problems in the construction industry. Management is a vital part of every business. Management's job is to prepare, coordinate, and monitor resources efficiently to meet the organizational objectives and goals (Akinradewo & Aigbavboa, 2019). The construction industry includes many main players, such as architects, builders, employees, developers, manufacturers of materials and machinery, construction staff, financiers, accountants, attorneys, insurers, and operators, who contribute to the economy by turning diverse capital into developed public infrastructure and facilities (Ali, 2011). The construction planning process through a process group is an effective way to accomplish the goals of the project. Effective project planning and management enhance the performance, increase profitability, and productivity of organizations (Chilawal & Mishra 2018). Lack of planning encompasses frequent changes in scope of mega projects causing delays in a project that lead to an escalation of costs of project or project failure due to mismanagement of key activities (Akinradewo & Aigbavboa, 2019).

Evidence from Shahhossein et al. (2018) findings suggests that the root cause of failure of construction projects using Fault Tree Analysis. Findings of the study suggest that the

majority of the problems stem from a lack of expert knowledge judgments resulting in shortcomings in the process of bidding and financial concerns. Evidence from Abusafiya & Suliman (2017); Alsendi (2015); Falamarzi & Suliman (2015); Hasan et al. (2014) on construction projects conducted in Bahrain suggests that schedule delays, a mistake during construction and frequent design changes are a common occurrence which poses significant consequences on project outcomes causing cost overruns.

In the analysis of the management of building projects, the principal-agent has been successfully applied. The relationship between the owner of the project as the principal and the contractor as an agent has been based. The relationship has also been between the contractor as principal and sub-contractors as agents. To some extent, deciding whether a project is a success or a failure is subjective (Ika, 2009). Project success is defined as “*primarily in the eyes of the beholder*”, implying that one stakeholder can consider a project to be successful while another considers it to be a failure. A shared understanding is needed to minimize the subjectivity surrounding project performance. To accomplish this, performance metrics should be defined during the project's initial stages.

This study, by presenting interpretations and observational data from previous experiments, explores the relationship between project planning, knowledge integration, and risk management with project success.

LITERATURE REVIEW

Project success defined as “*the perceived degree of achievement of predetermined performance objectives and participants’ expectations of the execution of a construction facility or a service*” the success and failure of the project which can be measured by the outcome of the project Ali (2011). Success factors of a project are that inputs that lead the management system towards the success of the project which is divided into categories i.e. hard that are objective, tangible and measurable, and soft that are intangible, subjective, and less measurable. To some extent, deciding whether a project is a success or a failure is subjective. It's worth noting that, even with detailed definitions for project success criteria, certain project criteria, such as product usability or approval of new processes, are subjective by default. Subjectivity is minimized by approaches and procedures aimed at quantifying subjective measures. If subjective criteria are combined with objective criteria, which decide whether a project is considered a success as a whole, projects involving a diverse community of stakeholders are unlikely to achieve a consensus (Ika, 2009). The success of a project has been calculated in a range of ways. While traditional measures of project success have concentrated on tangibles, current thinking is that, in the end, stakeholders, especially the primary sponsor, are the best judges of project success. The ultimate goal of any project operation, including design and building projects, has always been a success (Yang et al., 2020). While project success has been extensively addressed in the construction and project management literature, it has proven difficult for a diverse community of writers to agree on project success requirements.

Planning is famous for increasing the performance of the project in terms of expense, schedule, and efficiency, planning is known to increase construction project performance. However, project teams also do not implement efficient methodologies for preparation, usually citing a lack of time or desire to perform comprehensive planning. Generally, the preparation of large public initiatives begins with the front-end process. Many projects are insufficiently studied in advance, a weakness that adversely impacts the chances of completion of a project. Evidence

from the study of Akinradewo & Aigbavboa (2019) shows that project planning in construction is a very critical task as it determines the whole layout of how the construction project will be executed. The construction plan lays out how the project will be executed and complete within the designated time under the given scope which is a combination of time, cost, and quality. The success of the project plan is dependent upon the ability of the contractor however in case of an inability of the contractor to complete the project and meet the success criteria can result in abandonment of the project therefore project plan is the most crucial part of the project. Empirical evidence from the study of Chilawal & Mishra (2018) the close association between project management and project success has been recorded because construction industry management is a key aspect that may influence project efficiency. One of the frequent problems seen within the construction industry is a delay in construction projects due to ineffective project planning. According to Gibson et al. (2006), project preparation activities are positively related to project performance and inversely related to risks. Naeem et al. (2018) depicted that the success of the project is mostly the outcome of exceptional planning during the procedure of the project. Zwikael et al. (2014) overly comprehensive planning will increase project time without a significant impact on other aspects of project performance in low-risk projects, where efficient production delivery is more assured than in high-risk projects. Hyväri (2006) looked at project success in a variety of organizational settings and discovered that different contingencies affected the impact of essential success factors on project success.

Construction and engineering organizations have the highest standards of project planning, both at the organizational and project management levels, according to the quality analysis of project planning in different industries. This is most likely due to the project-oriented existence of these organizations. Its greatest weakness is risk management, which may arise from a lack of managerial know-how. The other extreme industry is production and maintenance organizations that are planning their projects at the lowest level of quality, perhaps because of the difficulty they have in understanding the basic difference between managing a project and performing their day-to-day tasks (Zwikael & Globerson, 2006).

Integration of knowledge is termed as the knowledge exchange between all stakeholders, the distribution of old and present knowledge among project parties, and the intake of all information into the present system of knowledge transfer. As the main element of sustainable progress, the incorporation of expertise and ideation in project portfolio management is indicated (Heising, 2012). The central aspect of managing project integration and project efficiency has also been defined as information integration for effective projects, firms, and process groups.

To achieve the managerial goals, there is a need for adequate understanding and knowledge of performance that is desired to be accomplished. The knowledge management and its integration are a crucial aspect that enables construction organizations to develop organizational capacity to create competitive advantage (Yang et al., 2020). The tools and techniques and knowledge are unique for construction management. For effective management of a construction project, project managers need to understand the effective use of knowledge and expertise. Development associations utilize different procedures for information the executives, for example, dynamic information the executives, information solicitations of specialists, information planning, networks of training, and so on the task organizer ought to be all around educated regarding the monetary, social, legitimate, innovative, hierarchical, administrative, social, political, moral, mental and instructive levels in which the development organizations work to make or dispense with circumstances and dangers. This can help the project manager to effectively plan the project by the effective allocation of resources.

Integration refers to inter-process collaboration. One of the most critical components of project management, encompassing all facets of a project, is integration management. Management of project integration ensures good collaboration between project activities. Integration is a deliberate method of establishing a governance framework, making it more systematic to manage key stakeholder criteria. Empirical evidence from the study of Yang et al. (2020) conducted a quantitative study to examine the impact of project planning on knowledge integration and project success. They evaluated 301 project members within the Chinese construction industry. The findings of their study revealed that knowledge integration can positively mediate the relationship between the project plan and project success. Their Findings have shown that mediating the role of knowledge integration can enhance knowledge management and innovation practices in an organization.

A project risk is an event that can be either positive or negative, but usually seen as an exposure to a scenario that leads to an adverse outcome. By definition, a project is a new undertaking, and risks are inherent in projects due to the complexities and unknowns associated with, say, the creation of a new product or the construction of physical/electronic infrastructure. The success or failure of project risk management can be determined to a large degree by risk detection before and during the project life cycle. Risk factors can be grouped into different categories. Weiss & Wysocki (1992) grouped five categories of risk according to risk-takers. Risk factors may overlap because the effect of one risk can trigger other risks. As a consequence, defining risk factors efficiently can be a challenging but important challenge for project success. The danger inherent in a building project is the possible risks that impact the project's progress. In other words, it can be said as the adverse impacts due to the occurrence of any certain or uncertain event poses a threat to the success of the project. The managers can avoid risk in a construction project in four ways that are through the identification of the risk, assessment of the risk, analysis and impact of the risk, and the management response towards the risk. The successful risk management and the achievement of project success factors or requirements have a direct relationship, particularly because risks are evaluated based on their possible impact on project objectives. Considerably, risk management does not imply the absence of uncertainty, but rather the reduction of risk's negative effects. Empirical evidence from studies of Heising (2012) has shown that implementation of risk management practices can help construction firms to avoid and mitigate various major risks through proactive management and handling of the risks. After reviewing and going through literature in depth from various studies such as Emam et al. (2014); Hasan et al. (2014); Falamarzi & Suliman (2015); Alsendi (2015); Abusafiya & Suliman (2017), it has been learned that project planning, the application of information and risk assessment provide a huge effect on project efficiency and progress. Further, it has been found that risk management and knowledge integration play a key role in project success. Several variations of the project risk management process have been proposed. Boehm (1991) proposed a process composed of two key phases. One is the risk assessment, which involves identification, analysis and prioritization, and risk control, which involves planning risk management, risk resolution, and planning risk monitoring, tracking, and corrective action. Fairley (1994) talks about seven steps: (1) Identification of different risk factors; (2) Assessing different probabilities and impacts in risk; (3) Develop strategies to mitigate risks that were identified; (4) Monitor different risk factors; (5) Use a contingency plan; (6) Managing crisis; (7) Recover damages caused due to crisis.

METHODOLOGY

The research methodology focuses on the design that will be implemented to obtain the data to accomplish the research objectives. It includes research design, data type, and sources, data collection, data collection, and data analysis techniques. The study uses a Phenomenology research design where qualitative research methods will be adopted by the author to identify phenomena and focus on subjective experiences and understanding the structure of those lived experiences. In the proposed study, the influence of Project Planning, Knowledge Integration, and Risk Management on mega Project success is studied. In this proposed study the narrative of project managers on the importance of planning, knowledge integration, and risk management is examined.

Below Figure 1 shows the conceptual framework which encompasses three independent variables which include project planning, knowledge integration, and risk management, and one dependent variable which includes project success. This framework will be explored in the context of mega projects conducted in the Kingdom of Bahrain catering to the perception of construction managers who are using design bid and build, design-build and design, bid, build and transfer approach to construction management. The effect of efficient planning while working on the project will be measured in the study.

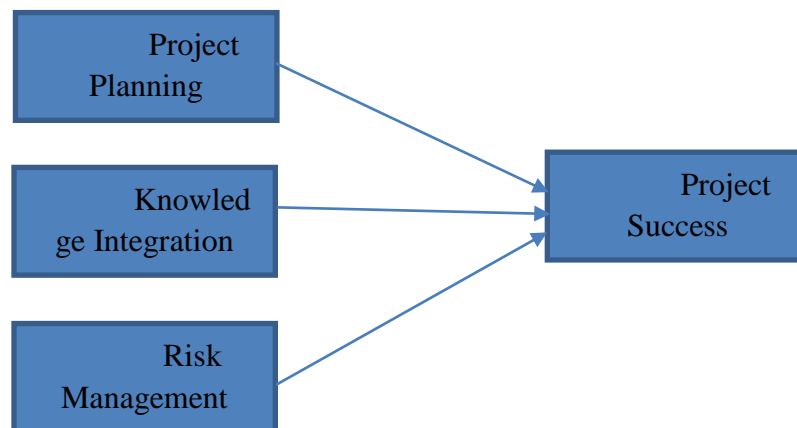


FIGURE 1
CONCEPTUAL FRAMEWORK OF THE STUDY

Data types can be classified into two types which include quantitative and qualitative research methods. Quantitative research techniques will be incorporated for data collection. The study will use secondary data from published resources while primary data will be collected using questionnaires as instrumentation.

The study will be quantitative as the study aims to quantify the extent to which project planning, knowledge integration, and risk management contribute towards the performance of mega projects in the Kingdom of Bahrain. Using questionnaires as instrumentation to gather primary data from stakeholders directly involved in the planning and execution of mega projects will enable the author to quantify the extent to which these determinants contribute to the project's success. Respondents of the study have been shortlisted under the guidelines of inclusion criteria. These guidelines include the designation of respondents and mega construction projects valuation as the author intends to target mega projects with an estimated valuation of

more than USD 100 million. The exclusion criteria include lower-level management, contractors, and projects conducted outside the vicinity of the Kingdom of Bahrain.

Andrews & Currim (2003) defines, a survey as *“a perfect vehicle of collecting data and requires participants of the study to recall their past behavior which can more accurately be captured through observation”*. The study intends to use the survey as a data collection instrument which comprises two sections. The first section is to explore the demographics of survey respondents to assure compliance with the inclusion and exclusion criteria mentioned by the author. The second section aims to investigate each variable in the research using a Likert Scale from 1 to 5 where 1 strongly disagrees whereas 5 strongly agree. Items on risk management and project planning have been adapted from the previous studies. There are different ways to gather survey data face to face or electronically. This survey has been conducted electronically using Google Docs forms. The advantage of conducting a web-based survey is that it can be easily analyzed without any administration where responses can be automatically processed in a database.

Questionnaire items measuring personnel planning developed by using Likert Scale from 1 to 5 aims where 1 is very unimportant and 5 is very important to investigate the extent to which project planning predicts project success in mega projects. Questionnaire items on knowledge integration developed using Likert Scale from 1 to 5 aim where 1 is very unimportant and 5 is very important to investigate the extent to which knowledge integration predicts project success in mega projects. The items on knowledge integration shed light on various competencies developed during the planning and execution of mega projects which include service, organizational, culture and resource mobilization competencies play an essential role in predicting the success of megaprojects. Questionnaire items on risk management developed by Zwikael et al. (2014) using Likert Scale from 1 to 5 aims where 1 is very unimportant and 5 is very important to investigate the extent to which risk management predicts project success in mega projects. The items on risk management shed light on various approaches of risk management which include stakeholder’s management, impact and likelihood assessment, risk register, and risk assessment plan which plays an essential role in predicting the success of megaprojects. Questionnaire items on project success is developed by Zwikael et al. (2014) using Likert Scale from 1 to 5 aim where 1 is very unimportant and 5 is very important to investigate the extent to which projects have been rated successful in terms of budget, time, cost, quality, value addition and customer satisfaction. Total set of n=175 respondents for the survey has been gathered using a random sampling method from the population executive staff working on various mega construction projects in Bahrain.

Variables Name	Cronbach’s alpha	Interpretation
Project Success	0.79	Moderately Reliable
Project Planning	0.81	Highly Reliable
Knowledge Integration	0.83	Highly Reliable
Risk Management	0.91	Highly Reliable
Overall Reliability	0.93	Highly Reliable

Data gathered from questionnaires have been analyzed using statistical package for social sciences where tests related to descriptive and inferential statistics were processed. The first part of represents the descriptive analysis in which the frequency of people's responses is mentioned. Then the Pearson's correlation among different variables is discussed representing how different

variables are influencing each other. After that, the strength of the model proposed was examined through regression analysis. The last part discusses the findings of the study.

Reliability is concerned with the level at which measuring phenomenon gives consistent and balanced results. Cronbach's Alpha test has been used to measure the reliability of questionnaire items which suggests that all variables exhibit alpha value of more than 0.7 which is higher than the lenient cut off value (Table 1).

RESULTS

The Pearson's Correlation is to evaluate if there are enough statistical proofs about the linear association among the pairing of variables in the samples. The correlation is interpreted is measured through the correlation coefficient also termed as r . The value of r indicates the strength and direction of the linear relationship between the study's pairing variables (Perinetti, 2019). The Table 2 shows the output processed in SPSS. Findings show that project planning is positively correlated with project success with $r=0.526$ considered moderate correlation between these two variables as the value of the correlation coefficient is intermediate between 0 and 1. Knowledge integration is positively and moderately correlated with project success with the correlation coefficient of $r=0.575$ which is moderately associated as the value of coefficient lies at the center between 0 and 1. The risk management behavior is positively correlated to risk management and there is a strong correlation between risk management and project success. The value of the correlation coefficient $r=0.733$ means that risk management is strongly correlated with project success.

	Project Success	Project Planning	Knowledge Integration	Risk Management
Project Success	1.00			
Project Planning	0.526	1.00		
Knowledge Integration	0.575	0.534	1.00	
Risk Management	0.733	0.564	0.669	1.00

Regression analysis is performed for calculating the correlation among two and more variables having cause and effect association. Multivariate regression is to make an account for the change in a dependent variable because of independent variables, synchronically. The objective of using multiple regression is to presume the significance of dependent variables through the use of a combination of p values that indicates predicting the worth of dependent variables for creating a model, underlying presumptions, and interpretation of findings.

The table below provides the model summary for regression recommending that the R -value for the approach of multiple regressions is 0.750 which is equivalent to 75%. Hence the results of the model summary explore that the independent variables which involve 75% of the variance in predicting project success initiatives in the construction industry in Bahrain. The Adjusted R square value is 0.563 which means 56% of the proportion of variance is explained using predictor variables that involve project planning, knowledge integration, and risk management. The considerable change value is 0.000 which implies that the model is considered as the value is less than 0.05, a significance level of interval.

The value at path ($\beta=0.139$, t -value= -2.202 and $p<0.05$) signifies that project planning has a significant and positive influence on project success initiatives in the construction industry in Bahrain. Therefore, the hypothesis stating that project planning has a positive influence on

project success is accepted. Moreover, the value for the path ($\beta=0.103$, $t\text{-value}=1.599$ and $p>0.05$) identifies that knowledge integration has a non-significant and positive influence on the success of the project, so hypothesis (H2) is rejected. Furthermore, path value ($\beta=0.502$, $t\text{-value}=8.040$ and $p<0.05$) identifies that risk management has a significant and positive influence on project success, so hypothesis (H3) is accepted (Table 3). The multiple regression equation is represented by the following equation.

Coefficient of Regression	β	t-statistic	p-statistic
(Constant)	1.149	4.583	0.000
Project Planning	0.139	2.202	0.029
Knowledge Integration	0.103	1.599	0.112
Risk Management	0.502	8.040	0.000

β_0 is the constant term in the equation whereas β_1 to β_p are the coefficients relating the explanatory variables to the variables of interest. The multiple regressions have been calculated using SPSS where mean values of each explanatory and controlled variable have been used. The below equation explains the linear association to create a model to predict a better lifestyle. The equation for the research and results of the present work is given as:

$$\gamma = 1.149 + 0.139(\text{Project Planning}) + 0.502(\text{Risk Management})$$

DISCUSSION

The research was performed to study the impact of proper planning, risk management, and knowledge integration on the success of any project. The research was conducted from the data gathered from 150 respondents through the random sampling method. Our results from the present study are supporting the results of the previous studies because they also show the positive and moderate relationship between the planning and success of the project. The second independent variable of knowledge integration represents a medium association with project success, and the third variable of risk management represented a strong relationship with the success of the project. This is synchronized with the previous findings which suggested that risk management has a positive and strong relationship with project success specifically in large projects in the construction industry.

The results showed that proper planning before starting working on the project will cause a significant influence on the success of the project. This is consistent with the previous studies performed and stated that appropriate planning and monitoring are among the most critical elements for the success of the project while executing the project. The hypothesis was thus proved true as it was hypothesized that project planning is significantly correlated with project success. A different independent variable Knowledge Integration has no significant impact on the success of the project because there is no association between the two following the statistics achieved from the present research. It proved that the second hypothesis in our research was not true, because the hypothesis represented a strong correlation of knowledge integration with the success of the project specifically in the mega projects of the construction industry in Bahrain. The previous study by Yang et al. (2020) examined the influence of project planning on the integration of knowledge while our research is about the influence of knowledge integration on the success of megaprojects in the construction industry. The other variable risk management had

a positive and significant relationship with the project success according to the present study. This is synchronized with the previous studies conducted by Abusafiya & Suliman (2017). It proved that the third hypothesis proved correct that says that risk management is significantly associated with the project success in the mega construction projects in Bahrain.

A major contribution of this research to the literature is the investigation of the moderating impact of risk management planning, which builds on previous studies that identified the relationship between project risk level and project performance. The level of risk is negatively associated with project performance when no or low levels of risk management preparation are invested in a project, according to this report. Higher risk levels, in other words, lower project success rates. As a result of these findings, risk management appears to be a successful process for reducing uncertainty and project success rates. This result contradicts previous research that showed risk management techniques are only successful when unpredictability and complexity are minimal.

Risk management planning was discovered to be an important method for reducing the effects of risk levels on project success rates in this research. However, since the literature has found certain flaws in existing risk management practices, this section proposes a potential study and practice directions.

CONCLUSION

The current study is to examine the influence of the three predictors that would vary the success of the project. The three predictors are project planning, knowledge integration, and risk management. The study is a quantitative study performed in Bahrain specifically targeting large-scale construction projects. The small construction projects were not part of the research.

It was represented in the literature that appropriate project planning, risk management, and knowledge integration have a significant impact on the success of any project. In this research, mega projects from the construction, industry were considered. The conceptual framework indicates that performing complete planning before starting the project can result in the effective delivery of the project because in the planning phase, all steps to be taken, resources required, monitoring and evaluation plans are well defined and strategies regarding actions to be taken during changing circumstances are all decided. The influence of knowledge integration is also evaluated in this research that did not result in performing any significant influence on the success of large projects of the construction industry. It was seen in the present study that the proper risk management plan is also necessary to achieve desired output from the efforts while working on construction industry projects. Identification of possible risks, evaluation of their possible effects, and mitigation plan are necessary if the on-time delivery and best outcomes of the project are required.

The current study's findings are consistent with previous research, which shows that better preparation early in the project life cycle has a positive effect on the final project outcomes. The current study's findings show that project planning is positively related to project performance as a result hypothesis one is accepted. According to the report, accepting the H1 improves project efficiency, which leads to project progress, since successful project planning is done. The presence of a risk management mechanism was thought to contribute to different aspects of project performance. Hypothesis two was tested and found to be rejected as our findings suggest that there is no significant statistical relationship between knowledge integration and project success in mega construction projects in Bahrain. Lastly, our findings suggest that there is a significant statistical relationship between project risk management and project success

in the mega construction industry of Bahrain as project risk management is positively correlated with project performance, which is consistent with previous research. The reasons for this are that exploring new concepts can aid risk management to reduce its impact on achieving project goals and objectives, which contributes to project success. Furthermore, the remaining findings are consistent with previous research. Hypothesis three, that project preparation is positively correlated with project risk management, is checked. The strategic planning of assessing and handling risk incidents increases project adaptability, robustness, and resilience, resulting in project performance. A project manager who effectively handles risks during project pre-definition and maintains mitigation plans is the one who steers the project.

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